

# Basin-scale Seasonal and Interannual Transport Variability and Sensitivity from a Box Model of Puget Sound Circulation

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## **Abstract**

A box model of Puget Sound circulation is used to study seasonal and interannual variations in inter-basin volume transports. The model dynamics include conservation of mass and salt and a vorticity balance. Idealized forcing and mixing functions based on 1990's data are used. Model transports vary seasonally by up to a factor of 3 depending on the basin, with time of peak transports ranging between June and November. The largest seasonal difference occurs in the Main Basin where transport decreases sharply in the fall as river flow increases. This decrease is due to the largest river flow entering seaward of the Main Basin and decreasing the salinity gradient between the Main Basin and Admiralty Inlet. A forcing sensitivity study is able to separate how much of the transport variation is due to river flow and how much is due to Strait of Juan de Fuca (SJF) salinity. In all basins except Admiralty Inlet and N. Hood Canal, river flow variability accounts for more of both the seasonal and inter-annual variability than does SJF salinity changes; in N. Hood Canal SJF salinity has a larger seasonal effect than river flow, but the reverse for inter-annual variability. Resulting residence times show a high degree of inter-annual variation, particularly in the Main Basin.